

## NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE STANDARD

### COMPOSTING FACILITY

(No.)  
CODE 317

#### DEFINITION

A facility to process raw manure or other raw organic by-products into biologically stable organic material.

#### PURPOSE

To reduce the pollution potential of organic agricultural wastes to surface and ground water.

#### CONDITIONS WHERE PRACTICE APPLIES

This practice applies where:

- Organic waste material is generated by agricultural production or processing.
- A composting facility is a component of a planned agricultural waste management system;
- A composting facility can be constructed, operated and maintained without polluting air and/or water resources;
- There is a need to improve air quality by reducing the emissions of odorous gases; and,
- The facility is operated as a component of an agricultural management system.

#### CRITERIA

##### General Criteria Applicable to All Purposes

**Laws and Regulations.** The installation and operation of the composting facility shall comply with all federal, state and local laws, rules and regulations.

**Safety.** Safety and personal protection features and practices shall be incorporated into the facility and its operation, as appropriate, to minimize the occurrence of equipment hazards and biological agents during the composting process.

**Facility Siting.** The bottom elevation of the composting facility shall be above the seasonal high water table and on soils with at least 15 percent clay content or a permeability of no greater than  $1 \times 10^{-5}$  cm/sec or the facility shall be installed on concrete slabs or other appropriate liners. Earth liners shall have a minimum thickness of 8 inches.

Ideally, compost facilities should be located outside of floodplains. However, if site restrictions require location within a floodplain, they shall be protected from inundation or damage from a 25-year flood event or larger.

Locate compost facilities so prevailing winds and landscape elements such as building arrangement, landforms and vegetation minimize odors and protect the visual resource.

Direct surface runoff away from the compost facility. Direct contaminated runoff from compost facilities to an appropriate storage or treatment facility for further management.

**Compost Mix.** Develop a compost mix that encourages aerobic microbial decomposition and avoids nuisance odors.

**Carbon-Nitrogen Ratio.** The initial compost mix shall result in a carbon to nitrogen (C:N) ratio between 25:1 and 40:1. Compost with a greater carbon to nitrogen ratio can be used if nitrogen immobilization is not a concern.

**Carbon Source.** A dependable source of carbonaceous material with a high C:N ratio shall be stored and available to mix with nitrogen rich waste materials.

**Bulking Materials.** Add bulking materials to the mix as necessary to enhance aeration.

The bulking material may be the carbonaceous material used in the mix or a non-biodegradable material that is salvaged at the end of the compost period. If a non-biodegradable material is used, provision shall be made for its salvage.

**Moisture Level.** Provision may be made for maintaining adequate moisture in the compost mix throughout the compost period within the range of 40 to 65 percent (wet basis).

In high precipitation climatic regions, care shall be taken to prevent excess moisture from accumulating in the compost. Facility covers may be required to provide for a suitable product.

**Temperature of Compost Mix.** Manage the compost to attain and then maintain the internal temperature for the duration required to meet management goals.

When the management goal is to reduce pathogens, the compost shall attain a temperature greater than 130°F for at least 5 days as an average throughout the compost mass.

This temperature and time criterion may be achieved during either primary or secondary composting stages or as the cumulative time of greater than 130°F in both stages.

**Turning/Aeration.** The frequency of turning/aeration shall be appropriate for the composting method used, and to attain the desired amount of moisture removal and temperature control while maintaining aerobic degradation.

**Facility Type.** Selection of the composting facility/method shall be based on the availability of raw material, the desired quality of final compost, equipment, labor, time and land available.

Facility structural elements such as permanent bins, concrete slabs and roofs

shall meet the requirements of Waste Storage Facility (313).

**Facility Size.** Size the compost facility to accommodate the amount of raw material planned for active composting plus space required for curing.

Dimensions selected for elements of the compost facility shall accommodate equipment used for loading, unloading, and aeration.

Sizing of facilities for composting dead animals shall be based on normal mortality loss records for the operation. If this data is not available, locally established mortality rates for the type of operation shall be used. Facilities composting dead animals require approval of designs by Idaho Department of Agriculture. Refer to IDAPA 02.04.17-Rules Governing Dead Animal Movement and Disposal.

**Compost Period.** Continue the composting process long enough for the compost mix to reach the stability level where it can be safely stored without undesirable odors. It shall also possess the desired characteristics for its use, such as lack of noxious odor, desired moisture content, level of decomposition of original components and texture. The compost period shall involve primary and secondary composting as required to achieve these characteristics.

Test the finished compost as appropriate to assure that the required stabilization has been reached.

**Use of Finished Compost.** Land application of finished compost shall be in accordance with Conservation Practice Standards; Nutrient Management (590) or Waste Utilization (633).

## CONSIDERATIONS

Develop an initial compost mix with a carbon to nitrogen ratio of at least 30:1 to reduce most offensive odors.

Minimize odors and nitrogen loss by selecting carbonaceous material that, when blended with the nitrogenous material

provides a balance of nutrients and porous texture for aeration.

A chemical neutralizing agent should be used if structural components do not provide adequate odor reduction.

Maximize solar warming by aligning piles north to south configured with moderate side slopes.

In humid areas, do not locate piles (windrows) across the slope to prevent ponding and soggy areas.

Protect compost facilities from the wind in cold climates. Wind protection may help prevent excess drying of the compost in dry climates.

Evaluate need for site-paving considering equipment operation, transfer of compost, soil compaction.

Locate composting operations where movement of any odors toward neighbors will be minimized. Buffer areas, vegetative screens, and natural landscape features can help minimize the effects of odors.

## **PLANS AND SPECIFICATIONS**

Plans and specifications shall be prepared in accordance with the criteria of this standard and shall describe the requirements for applying the practice to achieve its intended use.

## **OPERATION AND MAINTENANCE**

Develop an operation and maintenance plan that is consistent with the purposes of this practice, and the life of the composting facility. Recipe ingredients and sequence that they are layered and mixed shall be given in the plan.

Safety requirements for operation of the composting facility shall be provided.

Manage the compost piles for temperature, odors, moisture, and oxygen, as appropriate. Make adjustments throughout the composting period to insure proper composting processes.

Closely monitor temperatures above 165°F. Take action immediately to cool piles that have reached temperatures above 185°F.

The operation and maintenance plan shall state that composting is a biological process. It requires a combination of art and science for success. Hence, the operation may need to undergo some trial and error in the start-up of a new composting facility.

## **REFERENCES**

- Northeast Regional Agricultural Engineering Service, Cooperative Extension "On-Farm Composting Handbook", NRAES-54 and Field Guide to On-Farm Composting.
- NRCS, National Engineering Handbook (NEH), Part 637, Chapter 2, Composting.
- NRCS, NEH Part 651, Agricultural Waste Management Field Handbook.